

## ABSTRACT OF THE DISCLOSURE

A switching signal generator for a switching power supply employing a DC-DC modulator has an adder, an integrator and a quantizer. A gate driver circuit is provided upstream of a power switch element and receives a quantizer output. By feeding back a gate driver circuit output to the adder of the  $\Delta \Sigma$ -modulator, a large phase margin is obtained at a high-frequency switching. The switching signal generator for the  $\Delta \Sigma$ -modulation type switching power supply has an improved direct-current transmission linearity characteristic relative to direct-current input, and that is stably controllable and of high efficiency. Furthermore, a DC-DC converter has an adder, an integrator and a quantizer, the integrator having a mechanism for adjusting its gain. The gain-adjusting mechanism receives a signal from a current flowing internally of the DC-DC converter, a voltage internally of the converter, or a converter output voltage to control gain of the integrator so that the amplitude of output voltage of the integrator is not saturated and a comparator is capable of high-speed operation, a  $\Delta \Sigma$ -modulation type DC-DC converter is provided that is unlikely to undergo oscillation especially at a high sampling frequency, and that produces a stable output voltage.